Paper No. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHOJI KUWABARA

Appeal No. 2000-1958
Application No. 08/854,620

ON BRIEF

Before KRASS, LALL and SAADAT, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1, 2, 4 and 5, all of the pending claims.

The invention is directed to qualitative analysis for identifying elements in a sample by exciting the sample and spectroscopically analyzing light emitted from the sample. In the conventional analysis systems, wavelengths of various

elements were preliminarily stored in a memory device and the light emitted from the sample was compared against the stored values in order to identify elements which show values close to those in memory. However, many elements exist in the form of a compound, rather than in elemental form. When an element is in the form of a compound, a "chemical shift" is observed, i.e., the peak for that element appears at a shifted wavelength compared to when the element is in the elemental form.

Recognizing the "chemical shift" problem, the instant invention stores, in a database memory, reference spectral line data of various elements in different compound forms. If the measured spectral line data include spectral lines of any of the compound-forming elements, the reference spectral line data is compared with the measured spectral line data to thereby identify elements in the sample.

Representative independent claim 1 is reproduced as follows:

1. An apparatus for qualitative analysis for identifying elements contained in a sample by exciting said sample and spectroscopically analyzing signal light emitted from said sample, said apparatus comprising:

a data memory for storing measured spectral line data including chemical shifts obtained from a sample;

a data base memory storing reference spectral line data of

various elements in different compound forms; and

a data analyzer for determining whether said measured spectral line data include spectral lines of specified compound-forming elements including oxygen, nitrogen and carbon and, if said measured spectral line data include spectral lines of any of said compound-forming elements, comparing said reference spectral line data including chemical shifts with said measured spectral line data to thereby identify elements in said sample.

The examiner relies on the following references:

Meyer et al. [Meyer]	5,218,529	Jun. 8, 1993
Robbat, Jr. et al. [Robbat]	5,668,373	Sep. 16, 1997

Claims 1, 2, 4 and 5 stand rejected under 35 U.S.C. 103 as unpatentable over Robbat in view of Meyer.

Reference is made to the brief and answer for the respective positions of appellant and the examiner.

OPINION

It is the examiner's position that Robbat discloses the claimed data memory for storing spectral line data at column 7, line 68-column 8, line 1; the data base memory for storing reference spectral line data of various elements in different compound forms at column 8, lines 7-18; and the data analyzer at column 3, lines 34-55 and column 7, lines 63-65.

The examiner recognized that in Robbat the specific compound forming elements, oxygen, carbon and nitrogen, are not disclosed but held that it would have been obvious to include such elements as the compound forming elements since it was within the skill of the artisan "to select a known material on the basis of its suitability for the intended use" [answer-page 4].

The examiner also recognized that Robbat does not provide for "chemical shifts." However, the examiner turned to Meyer for a recognition of identifying materials using characteristic spectral line data including the storage of chemical shifts, citing column 5, lines 45-60, and column 7, lines 30-35, of Meyer. The examiner concluded that it would have been obvious to include, in Robbat, the storage of chemical shifts "to more clearly identify the chemicals present" [answer-page 5].

Appellant argues that Robbat is limited to the kind of analysis such as ultraviolet/visible radiation and mass spectroscopy where chemical shifts do not present any problem. Appellant concludes that since Robbat relates to a field of technology where there is no motivation to consider the effects of chemical shifts, there would have been no reason for combining any teaching of Meyer regarding chemical shifts with that of Robbat.

Appellant further argues that the chemical shifts considered by Meyer "are those related to the sample being measured, not those in spectral lines and stored for reference purposes" [brief-page 6], in contrast to the instant claims which require the presence of "reference spectral line data including chemical shifts" which are stored in a database memory and with which measured spectral lines are compared.

Finally, appellant argues that oxygen and nitrogen which may not be related to the target substance to be analyzed are preliminarily measured and stored as a database memory for the purpose of reference, but that this idea of preliminarily providing a reference database, as in independent claims 1 and 4, "is nowhere to be found in Meyer" [brief-page 7].

As to appellant's first argument, our review of Robbat does not find the disclosure therein limited, in any way, to only those environments wherein chemical shifts present no problem. It appears to us that Robbat is directed to a very general purpose analytic device for determining the presence or absence of a specific constituent in a mixture. Clearly, the mixture may have constituents which will appear in compound form rather than in purely elemental form. It is true that Robbat is devoid of any teaching of chemical shifts but the examiner contends that

the teaching by Meyer of considering chemical shifts when determining the presence of an element in a sample, would have led the artisan to consider such chemical shifts in the Robbat system when analyzing samples which may contain compound forms of a particular element.

The problem with the combination, as we see it, is that Meyer is directed to training a neural network to analyze organic materials using spectral data and, although Meyer mentions "chemical shifts" (e.g., column 18, lines 62 and 66), it is not at all clear that Meyer is storing measured spectral line data, including such chemical shifts, obtained from a sample and/or whether Meyer is comparing a reference spectral line data, including such chemical shifts, with the measured spectral line data in order to identify elements in the sample.

While Robbat teaches the measurement of spectral line data for elements, the storage of reference spectral line data of various elements and the comparison of the measured data with the reference data in order to identify an element in a sample, it lacks the measured spectral line data including chemical shifts and the storage of reference spectral line data of various elements "in different compound forms." If Meyer clearly taught or suggested that spectral line data may include chemical shifts

and that a reference database may comprise spectral line data of various elements "in different compound forms," then there might be a reason to combine since the skilled artisan would have been taught that a reference database may comprise spectral line data of not only various elements but also of such elements in a compound form and the artisan would have been taught to compare a measured spectral line data including chemical shifts with such reference data. However, Meyer does not appear to teach or suggest this much.

The examiner points to the abstract, column 18, lines 58-68, and column 19, lines 1-15, of Meyer for a suggestion of storing chemical shifts for reference purposes. However, our review of these identified portions of Meyer does not find what the examiner alleges is to be found. The abstract indicates that a network is trained, according to a predetermined training process, to identify particular materials, but the abstract does not indicate any database of reference spectral line data of various elements in different compound forms and a comparison, with that reference spectral line data including chemical shifts, of a measured spectral line data.

Column 18, lines 58-68, relates to enhancing performance of a neural network's tolerance to spectral data variations by

manipulating free induction delays (FIDs) of recorded spectra and that tolerance to "chemical shifts" can be obtained by mathematically modifying the original data. That portion of Meyer also indicates that "Chemical shifts can be changed by shifting the transformed spectrum left and right." We do not understand how, exactly, the examiner is relying on this portion of Meyer to teach or suggest a database of reference spectral line data of various elements in different compound forms and a comparison, with that reference spectral line data including chemical shifts, of a measured spectral line data.

Column 19, lines 1-15, of Meyer, relates to signal overlap in the hump region of the spectrum increasing as the complexity of a molecule increases. It explains that in order to get a satisfactory level of discrimination between closely related structures, resolution-enhanced spectra may be necessary for a neural network analysis. This section also explains that if the complex hump region of the spectrum can be resolved into individual lines, the spectrum may be more easily recognized by a neural network. Again, we do not understand how such disclosure is believed by the examiner to teach or suggest a database of reference spectral line data of various elements in different compound forms and a comparison, with that reference spectral

line data including chemical shifts, of a measured spectral line data.

Since we cannot find a clear suggestion in Meyer, and the examiner has not convinced us of such a suggestion, of a database of reference spectral line data of various elements in different compound forms and a comparison, with that reference spectral line data including chemical shifts, of measured spectral line data, we find no prima facie case of obviousness regarding the instant claimed subject matter.

Accordingly, the examiner's decision rejecting claims 1, 2, 4 and 5 under 35 U.S.C. 103 is reversed.

REVERSED

ERROL A. KRASS Administrative Patent Judge	)
PARSHOTAM S. LALL Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES

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